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Breaking up Big Banks

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Abstract: This paper discusses the proposals to limit the size of the banks, also known as tackling the banks' incentives to become "too big to fail". I examine how regulations to curb bank size may affect banks' operating costs. I analyze the relationship between the size of U.S. bank holding companies (BHCs) and their operating costs from 2001:Q2 to 2014:Q1. I find that rules to limit the size of banks could significantly reduce economies of scale. In particular, if large and cost-efficient banks become split into smaller parts, data processing, legal fees, audit and consulting expenses, expenses on premises are likely to increase.

The second part of the paper deals with the phenomenon known as "too big to jail" and examines banks' settlements. I compile a novel dataset on 341 litigation charges and settlements and find evidence that larger banks and banks with a higher credit risk, but not necessarily more systemically risky banks, face litigation charges more frequently. I do however observe that penalties had little effect on BHCs' profitability, and that some of the largest banks continuously faced litigation charges which may imply that benefits from wrongdoing outweighed the costs or that many large banks relied on the fact they they will be considered immune from prosecution due to their sheer size and their influence on the economy.

1.1 Introduction

The evolution of U.S. financial legislation reflects a long-running public debate about the appropriate size and scope of banking firms. As noted in Barth et al. (2012), financial institutions have been continuously growing in size. The assets of the top 50 companies in 2011 were roughly equal to total U.S. GDP, which represents about a four-fold increase in four decades. In the fourth quarter of 2011, the combined assets of the five biggest companies totalled about 60 percent of U.S. GDP. By contrast, in 1970 the corresponding figure was only 10 percent. For the top ten companies, the figures increased from 14 percent to 75 percent.[1]

The striking growth in size and importance of BHCs subsidiaries dates back almost entirely to the period after the passage of the Gramm–Leach–Bliley Act 1999, allowing the banks to engage in a broad range of financial activities in various states, including securities underwriting and dealing, insurance underwriting, and merchant banking activities, all of which led to intensified competition in the banking industry. Banks have also faced increased competition in wholesale markets, due to increasingly deeper and more efficient financial markets (e.g., high-yield commercial debt, CP, equity finance) which have provided banks' business customers with alternatives to traditional bank loans.

Well-managed banks responded to these competitive pressures by becoming more cost efficient and more revenue-efficient, which aligns well with the classic economic theory that suggests that when banks grow in size, there might be a significant number of benefits accompanying such expansion, for example, increasing economies of scale and an increase in the banks' bargaining power. This includes offering customers a wider range of new nontraditional fee-based products, selling increased amounts of existing fee-based products, pricing fee-based products more efficiently, improving the quality of fee-based products and services and minimizing costs by reducing the number of employees and introducing new technologies.

There has been a secular trend in recent decades toward enlarging and contracting the allowable scope of BHC activities. In general, it seems that contraction in banking activities usually follows major crises, and expansion is favored in boom years. It is axiomatic to assert that the past couple of years after August 2007 were not the finest or easiest to the banks. For example, since the recent financial crisis there have been several proposals to impose caps on bank size and limit the scope of banking activities, such as the "Volcker rule" provisions of the Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd–Frank Act) in the U.S. prohibiting BHCs from engaging in proprietary trading and limiting their investments in hedge funds, private equity and related vehicles. In particular, the recent financial crisis has brought forward concerns about

[1]A historic perspective on "too big to fail" is provided in Barth et al. (2012)

banks that regulators deem "too big to fail" in the sense that their failure would pose serious systemic risks, which has prompted calls for regulatory limits on bank size (Reich, 2008; O'Driscoll, 2009).

Recent petitions to break up "too-big-to fail" banks and pass new laws similar to the last century's Glass-Steagall Act have come in various shapes and flavors.[2] For example, Johnson and Kwak (2010: 214) argue that "*no financial institution [s]hould be allowed to control or have an ownership interest in assets worth more than a fixed percentage of U.S. GDP*" (they propose a 4 percent ownership ratio). Others suggest various alternatives including levies or progressively higher capital requirements on large banking firms to encourage them to shed assets. Big banks oppose efforts to break them up, reasoning that their larger size makes them more efficient. Also, the treatment of large banks as "too big to fail" could generate scale economies by lowering the risk premiums demanded by creditors of large banks, thereby giving them a funding advantage over smaller banks.

The assessment of the extent of scale economies is important for a full analysis of the costs and benefits of any policy intervention to limit the size of banks. Policymakers should consider the loss of any scale benefits when determining the net benefit of limiting the size of banks. Although bankers often claim that banks can lower costs by expanding in size, many policymakers and academics remain skeptical (e.g. Stern and Feldman, 2009; Greenspan, 2010; Haldane, 2010).

A frequently mentioned rationale for splitting large banks is that larger banks can enjoy cheaper insurance premiums disconnected from their actual risk levels, and implicit government insurance, since government cannot allow huge banks to collapse. This means they can essentially gamble for resurrection and expect to be bailed out if things go wrong. That is, it is possible that operating costs are no lower in big banks, but simply that large banks benefit from implicit guarantees. However, it may be the case BHCs become more efficient as they grow in size and subsequently can reduce their operating costs which will have a positive effect on a wider society and bank fees decrease, consistent with the classic economic theory. In that case, government-mandated size limits are likely to be a deadweight loss and constitute an unnecessary or even unfair form of intervention in financial markets.

In this chapter, I focus primarily on the costs which banks control internally. Thus, as far as banks' operating costs are concerned, it is true that while banks cannot generally choose what regulations to comply with, as these are most often exogenous, they are free to choose their operating costs. I examine questions such as whether banks obtain more bargaining power as they grow in size and thereby can reduce their operating costs, or whether some costs increase proportionally with size or perhaps some costs grow more rapidly than the growth of banks' assets. There exists some empirical evidence (e.g. Kozubovska (2017)) that size is positively correlated with opacity, and for that reason many of the banks' costs might rise (e.g. audit, legal fees, FDIC premiums) as it is more difficult to evaluate banks' exposure to various risks. On the other hand, postage and IT costs can decrease, as these may constitute monthly fixed costs which when spread over a

[2] For example, E. Warren's calls on Congress to break up the big banks: "U.S. Senator Elizabeth Warren on Wednesday called on lawmakers to break up big banks and change tax rules that benefit Wall Street. She said lawmakers should break big down and limit the U.S. Federal Reserve's ability to lend in a crisis so that big institutions cannot count on a bailout" (Reuters, April 15, 2015).

larger sized entity will increase operating revenue or alternatively decrease efficiency ratios. This is important because banks typically pass on these costs to customers or shareholders.

The recent financial crisis has not been solely an economic phenomenon, but a legal one as well. It has brought to light much of banks' wrongdoing. A frequently mentioned but perhaps less pronounced feature of big banks is that for a long time they have been shielded from legal responsibility for their misconduct. As noted by some leading U.S. judges, some banks have become "too big to jail" (Rogoff, 2016). Term "too big to jail" was coined to describe the theory that certain financial institutions, even if they engage in criminal misconduct, should be considered immune from prosecution due to their sheer size and their influence on the economy. A mere look at the levels of the recent tsunami of legal settlements shows why politicians have been active as ever in trying to break up big banks and eliminate the incentive for banks to become simultaneously "too big to fail" and "too big to jail". [3]

Litigation risk has been of paramount importance, especially after the mounting charges and litigation settlements related in particular to market manipulation litigation, U.S. mortgage-related issues, product mis-selling litigation, tax evasion litigation, U.S. embargo issues, misrepresentation litigation, and company-specific issues. The penalties for such behavior are sobering. For example, since 2009 litigation costs have grown four years in a row, and banks on both sides of the Atlantic have paid out a total of $178 billion in litigation costs; banks' legal bills have also swelled with them (WSJ, 2014). During the first nine months of 2014, banks in the U.S. and the E.U. paid out $60 billion to settle legal claims. That was up from $46 billion in 2013, $44 billion in 2012 and $22 billion in 2011, as noted in the recent research by Boston Consulting Group (BCG) and references in FT (2015). Even though U.S. banks have settled the bulk of claims arising from pre-crisis mortgages, BCG predicts that potential litigation risks remain substantial. For example, as of 2014 JPMorgan Chase said that it was involved in legal proceedings on more than 20 fronts, including investigation by the U.S. Department of Justice (DoJ) into whether the bank bought car loans that had been priced according to the race and ethnicity of the borrower.

The exact litigation costs vary based on data sources. For example, a British study came up with higher figures. According to the U.K. based CCP Research Foundation, the total post-crisis litigation cost aimed at the biggest global banks since 2010 hit $300 billion over a five-year rolling period (FT, 2015). Differences may come from various estimation techniques in quantifying losses, such as foregone profits or clients' attrition, the order to keep higher capital requirements or the prohibition from involvement in some type of lending business; or damage to a bank's reputation[4] might constitute another form of penalty.

Much of post-crisis litigation was mortgage related. For example, from 2010 through the end of third-quarter 2013, together the six "too big to fail" and "too big to jail" banks paid $85.75 billion in credit and mortgage-

[3] Elaborate discussion on litigation issues are provided in 'Litigation Handbook' prepared by OCC, available at http:// www.occ.gov/publications/publications-by-type/comptrollers-handbook/pub-ch-m-litigation-and-other-legal-matters.pdf.

[4] Reputational risk is the potential that negative publicity regarding an institution's business practices, whether true or not, will cause a decline in the customer base, incur costly litigation, or revenue reductions. (SR 95-51). For instance, the "reputational penalty" is estimated to be 7.5 times the total amount of penalties imposed by the U.S. Securities and Exchange Commission on the 585 firms subject to enforcement actions for financial misrepresentation between 1978 and 2002, as noted in Karpoff, et al. (2008).

related settlement costs. Bank of America paid out $43.9 billion; JPMorgan Chase paid out $26.4 billion; Wells Fargo paid out $9.5 billion; Citigroup paid out $4.7 billion; Goldman Sachs paid out $920 million; and Morgan Stanley paid out over $329 million. In addition to settlement monies, since 2008 the six banks have also had to repurchase ("buyback") $98.9 billion worth of bad mortgages they stuffed into collapsed mortgage-backed securities they sold to investors around the globe (SEC, 2015). However, these elements of the credit crisis and mortgage-related settlements are not the only measure of banks' misbehavior.

Reasons for other large recent fines include e.g. the manipulation of foreign-exchange markets. Bank of America paid $250 million to the OCC and has also agreed to pay $180 million to settle a lawsuit by private investors who accused the bank and others of manipulating foreign-exchange rates. In turn, Citigroup and J.P. Morgan paid more than $1 billion each in fines to various regulators. Bank of America is the third bank to settle investor claims related to the $5.3 trillion-a-day currency market. JPMorgan Chase & Co settled for $99.5 million in January, and Switzerland's UBS AG settled for $135 million in March. Another example of fines with U.S. regulators includes HSBC which settled a deferred prosecution agreement with the U.S. DoJ for $1.9 billion after the British bank facilitated money laundering. The amount included $655 million in civil penalties and $1.25 billion forfeiture, approved in July 2013. This has been the largest penalty placed on a bank for violating Bank Secrecy Act (hereafter BSA). A majority of sources (e.g. WSJ, FT) document that the majority of costs originate with U.S. regulators' legal claims; typically banks in the U.S. face much higher costs compared to other countries and occurrences of banks suing each other is more rare.

So far, it has been noted that the largest banks are balancing the risk of paying penalties while generating significant revenue from such wrongdoing. A glance at the frequency of litigation settlements (Table 2a and Table 3a in Appendix 2) supports the notion that fines do not act as efficient deterrents against engaging in financial misconduct. Therefore, in the U.S. in particular, the regulatory authorities have increased their appetite to pursue litigation against banks.

Litigation risk is of interest on its own. Litigation risk is different from other risks that banks may face. What distinguishes litigation risk from most other risks is that litigants lack a mechanism to dispose of litigation risk (Molot, 2009). Virtually any other risk that a business faces can be spread out or eliminated via the market by purchasing some form of insurance. Also, if a new business line is too costly or risky for a bank to pursue on its own, it can find a larger partner and undertake a joint venture, or it can raise capital for the project through public or private markets, in the form of debt or equity. When it comes to litigation risk, however, a bank that is sued is generally stuck with this risk. Insurance companies do not sell after-the-event insurance policies for lawsuits that have already been filed and there does not exist a market in which litigants can trade away litigation risk. Neither the legal profession, nor the insurance industry or the capital markets have yet found a way to relieve litigants of risk. The Federal Deposit Insurance Corp. (FDIC) said that a $4.4 billion increase in legal expenses for a small number of large banks was the key factor in a 7 percent drop in the banking sector's earnings for the fourth quarter of 2014. FDIC-insured commercial banks and savings institutions reported aggregate net income of $36.9 billion in the quarter, which was down $2.9 billion from earnings of $39.8 billion for the same quarter in 2013, mostly due to the rise in litigation costs at the large banks, according to a statement.

The motivation, contribution, originality and value of my study are the following. As for the contribution, I examine in detail BHCs' operating costs. Given the mixed findings of previous studies on the economies of scale in the banking industry, I analyze "too big to fail" BHCs in the U.S. from the perspective of the economies of scale from 2001:Q2 to 2014:Q1. I explore this issue using a much larger universe of banks than that of the existing study by the Clearing House (CH, 2011) on the banks' economies of scale. My sample is around two hundred times larger than that of CH and I use publicly available data from audited regulatory filings, as opposed to the proprietary internal management information used by the CH. I examine the extra costs citizens or shareholders will have to face if banks are broken into smaller banks and whether these costs are passed directly to bank customers or are translated into reduced firm value for shareholders. My choice is motivated by the paramount interest in the recent financial press in banks' incentive to grow in size, in litigation risk and in the consequences from the newly cooked regulations that will affect "too big to fail", "too big to jail" banks and their expenses.

I also provide some fresh evidence on litigation charges. I compile a novel dataset on 341 litigation charges and settlements, which to the best of my knowledge has not been used in any previous studies. It has been a significant effort to collect and classify expenses and I was the first to focus on banks' litigation expenses. Thus, I am not aware of any study which focuses on the characteristics of the banks and their litigation charges. This is surprising, given that the costs of litigation are colossal, especially once aggregated across the industry. More generally, my research also has implications for the literature on systemic risk. I test whether systemically more risky banks are also more likely to be involved in alleged financial wrongdoing.

1.2 Related Literature

1.2.1 Economies of scale and "too big to fail"

Economies of scale permit larger firms to produce their products and provide their services at lower average costs per unit than smaller firms (Shepherd, 1979). That is, as firms produce more, they spread fixed input costs over a larger quantity of output, thus lowering per unit average costs. This ability to manufacture products and to provide services at a lower average cost should translate directly into higher profits, while also possibly creating significant barriers to entry into any industry in which economies of scale are present, as noted in Bain (1954).

Advantages associated with increasing scale can be gained from a variety of factors (Scherer, 1980). For example, at the product or service level, expanding firms can invest in specialized and more efficient equipment, machinery, and technology, which lower per unit production costs. Firms also have incentives to further improve the speed and efficiency of these resources, and engage in efforts that further enhance the efficiency of their production processes and increase output. Increasing output also allows employees to specialize in their tasks and gain proficiency; as a result, increasing scale also produces experience or learning effects, which have been found to exist in nearly all industry settings (Wright, 1936; Asher, 1956; Shepherd, 1979; Rosenberg, 1982).

Overall, studies on economies of scale in the banking industry produced mixed findings. Studies have confirmed the existence of economies of scale and diseconomies of scale. The earliest studies of scale

economies in the banking industry, estimated during an era when U.S. banking organizations were on average much smaller than today, found evidence of modest economies of scale. For example, Mitchell and Onvural (1996) document that increasing levels of production in large banks is usually cost efficient; but they also found that there is relatively little to gain by increasing the scale of production. Thus, their study provides additional confirmation that the minimum efficient scale can be achieved in relatively modest-sized banks and that the average cost curve for most banking institutions is relatively flat. In contrast, in a study of commercial banks and savings and loan associations, using data from the 1960s, Benston (1972) found consistent economies of scale, indicating that larger banks and financial institutions enjoy significant cost advantages. Kim (1986) found that credit unions exhibit modest economies of scale, especially in their mortgage lending and investment activities. In an extensive review of the literature on economies of scale in financial institutions published prior to 1988 Clark (1988) concludes that smaller financial firms may be at a cost disadvantage compared to larger, more diversified banking firms. Others, using more flexible cost functions, found that these scale economies were only limited to small banks (Benston et al., 1982; Berger and Humphrey, 1991,1992; Peristiani, 1997), which would support the idea of breaking up big banks.

A number of studies, however, find evidence of scale economies even among the largest banking firms Feng and Serletis, 2010; Wheelock and Wilson, 2012; Hughes and Mester, 2013). These findings, in contrast to the previous evidence, oppose limits on the size of banks that would undercut economies of scale in banking.

The first systematic effort to examine and quantify the benefits that large banks provide to consumers, companies, and governments, as well as the U.S. economy as a whole is that by the Clearing House (CH, 2011). This study, which relies on proprietary data from a relatively low number of institutions, documents that large U.S. banks provide benefits for companies, consumers, and governments totaling an estimated $50 billion to $110 billion annually. Banks larger than $500 billion provide over half of the total benefit. It is also noted in the CH report that large banks spur innovation and economic growth, which could not be achieved if big banks were broken into smaller entities. For example, as noted in CH (2011), sophisticated and costly IT platforms allow large banks to provide global reporting and compliance, helping investors monitor and analyze their positions. However, this innovation may also lead to costly future litigation.

Smaller banks could not generate the volumes needed to make worthwhile the investment necessary to develop such reporting systems and global compliance expertise. Dedicated platforms and broad regulatory experience allow large custodians to undertake these activities much more efficiently and expertly than even large customers might on their own. This study estimates total annual benefits from large banks spreading innovation to be around $15 billion to $30 billion. CH analysis estimates that aggregate benefits from online bill payment, debit cards, credit cards, wire transfers, automated clearing house, check processing, and trade processing economies of scale associated with these seven services are $10 billion to $25 billion per year. This is not surprising. Many innovations require a large customer base to succeed, which is either impossible to achieve for small banks or will require many small banks to act together to capture the benefits of innovation.[5]

[5] Innovations include: ATMs, Online bill pay, DealerTrack, Fraud prevention, ACH, Wire, Check imaging.

Furthermore, as noted in several Uniform Bank Performance Reports (hereafter UBPR),[6] large banks tend to have lower efficiency ratios (*i.e.* banks are more efficient) because they generate more non-interest income compared to smaller banks. It is also noted that cost efficiencies are usually the underlying rationale for mergers and acquisitions. Costs savings in personnel expenses, occupancy expense, goodwill impairment, intangible amortization and other expenses are the main drivers of bank mergers and acquisitions. However, large banks are also perceived as having deep pockets and therefore attract greater levels of litigation[7].

In contrast to studies that find positive effects stemming from banks as they grow in size, many studies have concluded that expanding banks will eventually reach a point where average costs stop decreasing and start to increase. Benston et al. (1982) modeled a translog cost function to estimate U-shaped average cost curves, and their analysis found that the largest banks face significant diseconomies of scale. In a comparable study, Clark (1996) concluded that the average cost curve for banks is relatively flat with diseconomies of scale found only among the smallest and largest banks. Clark (1996) also notes that a lower efficiency ratio would generate higher ROA. In other words, the more efficient banks are not necessarily more profitable, because banks' concentration on reducing costs may actually contribute to poor investment decisions and increased risk taking.

As far as other reasons behind banks' operating costs are concerned, it has also been frequently mentioned in the literature that firms are operating inside their production possibilities frontier because of agency conflicts, management problems, or other inefficiencies, so-called X-inefficiencies[8] (Berger and Humphrey, 1991; Berger et al., 1993).

Overall, from around 220 articles[9] discussing large banks, 47 percent discuss the risk of large banks, 21 percent focus on the market effects, 12 percent examine the internal efficiencies of large banks (including economies of scale) and the remaining 20 percent focus on the scope of products and services. As for the views on costs versus benefits 71 percent of the studies on risk hold a view that large banks are more risky with the remaining 29 percent claiming the opposite. As for the internal efficiencies, 52 percent of the studies find negative effects stemming from the larger size of the banks, while 48 percent find that as banks grow in size they are actually becoming more internally efficient. As for scope, approximately 88 percent of the studies analyzed find large benefits to the general economy stemming from large banks. Large banks provide a broad set of products and services that smaller banks cannot provide at all, or at least cannot provide in an equally integrated and comprehensive manner.

In conclusion, the literature provides mixed evidence on the relationship between bank size and the various aspects of bank performance. Broader economic consequences of imposing caps on bank size are also not clear.

[6] UBPR reports were retrieved from http://www.ffiec.gov/ubpr.htm on June 6, 2015.

[7] Author is grateful to Prof. Simon Wolfe for raising this comment.

[8] The concept of X-inefficiency was introduced by Harvey Leibenstein (1966).

[9] These 220 academic articles are relevant articles from the past three years published in a selection of top economics and finance journals and articles cited in FSOC report and the Independent Commission on Banking**:** Vickers Report (2011).

1.2.2 Litigation overview

There is a relative scarcity of economic studies on litigation settlements in the banking industry. The majority of existing literature focuses on market reaction to the announcement of the litigation charges, providing mixed findings. Another strand of the literature focuses on corporate governance of the banks that have faced litigation charges (e.g. board independence or the characteristics of CEOs of those banks). The lack of studies is primarily because data on litigation settlements have been confidential for a relatively long time. In what follows, I present an overview on bank enforcement actions and several facts from recent industry publications and the financial press.

Enforcement actions can take one of two forms: (1) informal understandings between banks and their supervisors; (2) more formal actions, which are enforceable in the courts. Prior to 1989, however, the public never learned about the vast majority of enforcement actions, with which supervisors used to bring banks into compliance with consumer regulations and safety and soundness standards. In 1989, despite objections from various supervisory agencies in the US, Congress mandated disclosure of the most serious formal actions, cease-and-desist orders. Soon after, the Congress expanded disclosure requirements, directing that the public be notified about all formal enforcement actions.

For example, the Securities and Exchange Commission (hereafter SEC) did require depository institutions, with publicly traded stock, to disclose enforcement actions deemed "material." In addition, the Office of the Comptroller of the Currency (hereafter OCC)—on a limited, case-by-case basis—disclosed the facts surrounding its enforcement actions (Combating Fraud, Abuse, and Misconduct in the Nation's Financial Institutions (OCC, 1989). The Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA) and the Crime Control Act of 1990 required supervisory agencies for the first time to publicly disclose final, formal enforcement actions as well as any modifications or terminations of the actions (Gilbert and Vaughan, 2001). In the debate over FIRREA, the House of Representatives questioned the secrecy about enforcement actions, noting that bank supervisors were alone among federal regulators in keeping civil enforcement actions confidential (FIRREA 1989: 470). The House also asserted that confidentiality served only to perpetuate banker misconduct and exacerbate the problems of troubled institutions. Disclosure, in contrast, would inform taxpayers about the effectiveness of the bank regulatory system, warn depository institutions about the types of conduct that would not be tolerated and the financial community about particular problem banks (OCC, 1989).[10] It is also supposed to strengthen market discipline because an announcement that a supervisor had imposed a formal action warns depositors that serious regulatory compliance or safety and soundness issues exist in the affected institution. That is, from 1990 onwards supervisors have begun to announce publicly the imposition of formal enforcement actions.

The changes in 1990 in publicly announcing enforcement actions provides a quasi-experimental setting to test whether putting confidential supervisory information in the public domain will spark bank runs or whether it will enhance depositor discipline. Gilbert and Vaughan (2001) measure depositor reaction to 87 Federal

[10] A concise summary of financial firms' litigation matters is available at http://www.occ.gov/publications/publications-by-type/comptrollers-handbook/pub-ch-m-litigation-and-other-legal-matters.pdf.

Reserve announcements of enforcement actions. They compare deposit growth rates and yield spreads before and after the announcements at the sample banks and a control group of peer banks. Their findings do not show any evidence of unusual deposit withdrawals or spread increases at the sample banks following the announcements of enforcement actions. These results suggest that depositors were not sensitive to enforcement actions, nor did they alter their behavior when formal actions were announced.

In contrast, Cummins et al. (2006) show in their analysis, which covers all publicly reported banking and insurance operational risk events which affected a total of 403 bank and 89 insurance company events in the U.S. from 1978 to 2003, and which caused operational losses of at least $10 million, a strong, statistically significant negative stock price reaction to announcements of operational loss events. Other studies also reveal that operational loss events have a strong, statistically significant negative stock price impact on announcing firms (Cummins et al., 2005; Perry and de Fontnouvelle, 2005).

My study relates partly to recent research on personal liability for financial misconduct, as well as the effects of misconduct on CEO compensation and on the determinants and economics of corporate misconduct.

For example, Karpoff et al. (2008) examine the fortunes of all 2,206 individuals identified as responsible parties for all 788 SEC and DoJ enforcement actions for financial misrepresentation from January 1, 1978 through September 30, 2006. They report that 93 percent lost their jobs by the end of the regulatory enforcement period. Most were certainly fired. The likelihood of redundancies increases with the cost of the misconduct to shareholders and the quality of the firm's governance. This is motivated by prior research which shows that firm shareholders endure large losses when their firms are accused of misconduct; but there is little evidence on whether the individual perpetrators suffer direct financial costs for the damages they caused.

As for the factors related to the propensity to engage in financial misconduct, extant literature has pointed to a lack of monitoring by the board (Beasley, 1996; Agrawal and Chadha, 2005; Chidambaran et al., 2012; Hegde and Zhou, 2014; Khanna et al., 2014) outside investors (Wang et al., 2010), or various other parties (Dyck et al., 2010; Kedia and Rajgopal, 2011). Hence, the literature primarily studies litigation and fraud from the perspective of corporate governance on the role and design of corporate boards (e.g., Adams et al., 2010; Coles et al., 2012, 2014; Field et al. 2013; Minton et al., 2014; Hagendorff et al., 2015a, 2015b). My study is also partly related to the studies on governance and risk taking in the banking industry (Beltratti and Stulz, 2012; Adams and Ragunathan, 2013; Ellul and Yerramilli, 2013; Minton et al., 2014). Relative to other bank risk measures studied in the literature, enforcement actions provide a suitable identification of the effectiveness of internal governance. This is because enforcement actions provide an unambiguous external indicator of undesirable conduct in the industry.

A number of studies link fraud to the compensation of executives (e.g., Johnson et al., 2009). The often-mentioned misconduct by CEOs documented in the literature has been manipulating short-term performance to enjoy higher payouts. Persons (2006), who examines the impact of fraud and lawsuit revelations on U.S. top executive turnover and compensation, shows that out of all financial firms involved in fraud only a small number reduced their executive cash compensation and only a tiny percentage changed their top executives.

Apart from questions related to financial misconduct and whether the bank board matters for firm outcomes, it was misconduct in the mortgage markets that received much attention following the recent financial crisis, primarily in the legal literature, and to a lesser extent in the financial literature. Much of the literature examines the main legal issues that will play an important role in the extensive litigation in the residential mortgage market including a) the Rule 10b-5 class-action lawsuits that have already been filed against the banks pending the Employee Retirement Income Security Act (1974) (ERISA) litigation, b) the causes-of-action available to mortgage-backed security (hereafter MBS) and collateralized debt obligation (CDO) purchasers, and c) litigation against the rating agencies (see Bethel et al., 2008).

In contrast to the existing literature, my key question is the following. Which observable bank characteristics, are most closely correlated with bank propensity to face litigation? In particular, I analyze "too big to jail" issue and whether it is observed in the data that large banks were more often involved in financial misconduct and whether litigation charges had any impact on the banks' probability of insolvency. Certainly, the quality of the board is the missing variable in my analysis, but I hope to capture this omitted variable by including fixed effects in my regressions.

Some evidence points to the fact that until recently the federal government shielded big banks from criminal prosecution. The government was concerned that convictions may damage the financial system. One of the top Federal Reserve officials explicitly acknowledged this practice, which was long denied by the Obama administration.[11] Both Republican and Democratic lawmakers have long suspected that federal prosecutors did not pursue guilty pleas because they were afraid of the consequences, *i.e.* that the potential unraveling of a giant bank would endanger the global economy. For example, in 2012 the U.S. Attorney General Eric Holder posited that it becomes difficult for the DoJ to prosecute financial institutions that have become so large that criminal charges would "*have a negative impact on the national economy, perhaps even the world economy*." Certain charges, such as money laundering, could potentially cut a bank off from existing pools of investors such as pension funds and ultimately cost the bank its charter to operate in the United States. Holder's testimony sparked criticism that just as the federal government had deemed some banks "too big to fail" during the financial crisis, so too had the DoJ determined that some banks were "too big to jail." Holder later denied his previous comments after a public outcry in March 2013. Another statement: "*We were not willing to find those firms guilty before, because we were worried that if we found them guilty, that could somehow potentially destabilize the financial system*," was made by the president of Federal Reserve Bank of New York William Dudley.[12] For that reason, it has been reported that corporations are sometimes able to agree with the Department of Justice (hereafter DoJ) to have an offshore entity take the hit and enter the guilty plea. Such was the case in 2012, when UBS agreed to pay about $1.5 billion to settle LIBOR rigging charges, and a unit in Japan, where much of the wrongdoing occurred, pleaded guilty to criminal fraud.

There exist other media and government reports that found widespread regulatory failures at the Federal Reserve, specifically at Dudley's branch in New York. Former New York Fed employee Carmen Segarra also

[11] The notion that government shielded big banks from prosecution has been addressed in Huffington Post on 21 November, 2014, available at http://www.huffingtonpost.com/2014/11/21/fed-too-big-to-jail_n_6201476.html.

[12] Ibid.

released tapes showing higher-ups at the New York Fed ordering lower-level regulators to go easy on Goldman Sachs.[13]

However, I am not aware of any empirical studies that examine this issue of "too big to jail", nor of any analysis that would examine the effect of criminal charges against large financial institutions on the global economy or systemic risk, potentially undermining a key DoJ argument for why the world's biggest banks have escaped indictment.

Putting the "too big" rhetoric aside, the obvious fact is that no corporate entity can literally be "jailed." If for example the DoJ does pursue criminal charges against an entity, a common outcome is a settlement coupled with large fines. For instance, in 2012, HSBC agreed to a deferred prosecution agreement with the DoJ to settle allegations of money laundering. In that settlement, HSBC was required to pay $1.92 billion in forfeiture and fines, but avoided actual criminal indictment. All the above motivates me to examine whether large banks were more actively engaged in wrongdoing and how litigation settlements related to the size of the banks.

In Chapters 2 and 3 I found that large banks had higher systemic risk, were more opaque and securitized more often. In this chapter, I want to examine whether large banks have lower operating costs and whether they were involved in financial misconduct and faced litigation charges more frequently than smaller banks.

1.3 Data and Variables Construction

The data, in particular, FR-9YC forms, are retrieved from the Federal Reserve Bank of Chicago via WRDS. The core sample is a panel of all publicly traded U.S. BHCs that report on form FR-9YC,[14] which is filed quarterly on a consolidated basis by all U.S. BHCs with over $150 million in assets ($500 million after 2006). I examine BHCs with over $500 million in total assets because BHCs with total consolidated assets of less than $500 million are generally not required to file FR-9YC forms.

The FR-9YC reports contain detailed consolidated financial statements and other data for U.S. BHCs. As noted earlier, in March 2006, the minimum reporting size for BHCs was increased from $150 million to $500 million. This significantly skews the sample. To overcome this problem, I delete all the observations that do not reach the minimum reporting threshold over the sample period. I do this in order to make sure that banks that began reporting prior to 2006 have continued reporting since the threshold was raised from $150 million to $500 million in 2006. I adjust the threshold of $500 million for price level per quarter with base March 2006. This method of deleting the observations ensures that they are not deleted randomly, and helps to preserve all BHC observations that once started reporting and continue to do so even after a temporary drop in their total assets. I delete approximately 50 observations per quarter. My data set covers the period from 2001:Q2 to 2013:Q4.

[13]Tapes were retrieved from http://www.thisamericanlife.org/radio-archives/episode/536/the-secret-recordings-of-carmen-segarra on 6 June, 2014.

[14]BHCs are companies that own or control one or more commercial banks. Most banks in the U.S. are owned by BHCs. Currently, about 84 percent of commercial banks in the U.S. are part of a BHC structure.

I use the detailed information on the vast range of BHCs' non-interest expenses filed by BHCs in the memoranda of their quarterly regulatory FR-9YC filings. Since 2001, more than one-third of total non-interest expenses are classified in the FR-9YC as part of a broad "other non-interest expenses" category. The category "other non-interest expenses" represents more than one-third of industry non-interest expenses. The 11 standardized memoranda categories are: (i) data processing expenses; (ii) advertising and marketing expenses; (iii) directors' fees; (iv) printing, stationery and supplies; (v) postage; (vi) legal fees and expenses; (vii) FDIC insurance assessments; (viii) accounting and auditing expenses; (ix) consulting and advisory expenses; (x) ATM and interchange expenses; (xi) telecommunications expenses (see FR-9YC Schedule HI Memorandum Item 7). In addition, space is provided for BHCs to report additional "write-in" expense items that were not captured by the standardized fields and where the expense item exceeds 10 percent of total other non-interest expenses. This can be travel expenses, payments to insurance holders, software development, litigation settlements or even meals, as was reported by some smaller BHCs. BHCs record items for amounts greater than $25,000 that also exceed 3 percent of total other non-interest expenses. Note that non-interest expenses do not include loan losses due to defaults, trading losses, gains and losses on owned securities, or taxes; these are recorded in other parts of the income statement.

As for the three biggest other non-standardized fields, they pose some difficulties. It is particularly challenging to classify and analyze items recorded in the write-in expense fields, because they are reported using non-standardized language by each BHC. Therefore, I manually examined more than 30,000 text strings in the Schedule HI of FR-9YC. This involved manually skimming through about 5,500 individual "write-in" text fields reported by individual BHCs. That is, I examine more than 5,000 various expenses, manually typed by BHCs. I search for words which include settlements actions, litigation and alike. Banks do not use uniform names and there are significant numbers of typos. Some reported write-in items are difficult to interpret. For instance, while I can easily infer that litigation means litigation, other expenses may be less straightforward. In the end I am left with 341 litigation occurrences where expenses are first, second or third as identified in "Other non-interest expenses", which constitute more than 10 percent of other expenses. I drop ambiguous observations. I identify 130 "clean" occurrences where banks face litigation costs as the first highest item, 123 as second highest, and 90 as third highest. Text usually appeared as "INCOME ON LITIGATION SETTLEMENT", "RECOVERY ON LEGAL EXPENSES", "LAWSUIT SETTLEMENT", "INCOME FROM LITIGATION SETTLEMENT", "LITIGATION SETTLEMENT", or "LEGAL SETTLEMENT". Sometimes I observe the reason for the payment, e.g. "LAWSUIT TO A SOFTWARE VENDOR & THIS IS SETTLEMENT" or "IRS SETTLEMENT EXPENSES TO BE PAID". Note on the legal expenses: I do not aggregate legal fees and litigation settlement here. Some part of this finding may reflect the fact that small banks may lack internal legal teams, for which legal expenses would be recorded as part of compensation, and thus have higher external legal fees.

Although some data on the charges faced by institutions and chief executive officers (hereafter CEOs) or chief financial officers (hereafter CFOs) are available on the SEC website,[15] there is no central database that

[15]Limited data on the charges faced by institutions and their CEOs and CFOs are available on the SEC website http://www.sec.gov/spotlight/enf-actions-fc.shtml.

includes all of the litigation charges faced by banks. Bank regulators, specifically the Fed, the OCC, and the New York Department of Financial Services (NYDFS) are the main bodies dealing with banks' wrongdoing and some data are available. Also, the FDIC's Legal Division provides some aggregate information. However, the institution does not report PLC cost and recovery information by individual institution. Thus, that information cannot be used.

Quantifying all the litigation settlements is difficult as a single event may lead to numerous overlapping investigations and proceedings, either by multiple federal and state agencies and officials in the U.S., or in some instances by regulators and other governmental officials in non-U.S. jurisdictions (e.g. Citigroup in Japan). Therefore, for analysis of the litigation settlements, I rely entirely on the FR- 9YC forms only.

I proceed by eliminating observations with missing, negative or zero values for total assets, and observations where the loans to assets ratio exceeds 100 percent. Observations that report zero equity capital are also removed. Approximately 50 observations are deleted per quarter. In turn, I winsorize the independent and dependent variables at the 1 percent level to account for data errors and limit the effect of potential outliers, which is a standard procedure in similar studies.

As far as the independent variables (efficiency ratios and detailed expenses) in the first part of this essay are concerned, I proceed as follows. Typically, BHCs enter expenses with a positive sign, while some entries have a negative sign, thus I use my judgment and convert them into positive or leave those observations as missing. In total, I have changed the sign for 67 entries where expenses are written with a negative sign, because the majority of BHCs write expenses in positive terms, understanding that these are the expenses. It is reasonable to believe that a typo in the sign may have occurred.

Subsequently, to analyze stock prices and returns, I link FR-9YC forms with CRSP. I used the FRBNY link[16] to match regulatory identification numbers (RSSD ID) to the PERMCO, used by the CRSP. The RSSD ID is a unique identifier assigned to commercial banks or BHCs by the Federal Reserve. The dataset yields 769 PERMCO-RSSD links from January 1, 2000 to December 31, 2013.

1.3.1 Dependent variables

Just as in calculating the efficiency ratio, where I divide non-interest expenses by net income (interest plus non-interest income), I calculate ratios for all the expenses dividing the expenses by the bank's net income. Thereby, I obtain 14 separate efficiency measures that are used as dependent variables.

1.3.2 Control variables

Apart from the main variable of interest such as the logarithm of total assets or the size, the control variables in the first specification include BHCs' non-performing loans (a proxy for credit risk), capital level (Tier 1) and profitability; relative profitability (the bank's financial performance relative to its peers over the past three years (RELROE) is also used as a proxy for the quality of its management,[17] a variable used by DeYoung and

[16] FRBNY link is available at http://www.newyorkfed.org/research/banking_research/datasets.html.

[17] RELROE equals bank i's ROE minus the median ROE among the banks in bank i's asset class, calculated each year from t-3 through t-1 and then averaged. I used five asset classes: less than $100 million; $100 million to $500 million; $500 million to $1 billion; $1 billion to $10 billion; and more than $10 billion, all measured in 2001 dollars. I note that

Rice (2004) to approximate for management quality. The aim is to relax the omitted variable bias, if the quality of the bank's management correlates with both size and expenses. Apart from the standard control variables mentioned above. I also control for the asset shares held in various types of loans and assets. For instance, I include trading assets, securities, cash, fixed assets. I also include bank revenue composition. Copeland (2012) finds that there is a positive relationship between the relative importance of nontraditional income sources and asset size. Copeland (2012) classifies income into three types: traditional, securitization, and nontraditional. These categories are constructed so that income earned from new financial services would fall into either the securitization or nontraditional category. The traditional category contains the classic sources of income that most banks have relied upon over time, such as interest and fee income on loans, service charges on deposit accounts, fees for providing payment services, and income from fiduciary activities. Nontraditional income comes from five sources: a) net interest income from trading assets; b) venture capital revenues; c) investment banking; d) insurance income; and e) trading revenues. The securitization category captures income related to creating, servicing or selling securitized assets, while the nontraditional category contains sources of income related to the capital markets.

Following previous research (deYoung and Rice, 2003), I include the share of income that banks derive from interest income, investment banking income, trading income and fiduciary income (including insurance activities related income), three of which constitute a lion's share of revenue composition. I also include other income (e.g. safe deposit box rent, income and fees from ATMs, income and fees from the printing and sales of checks and miscellaneous income) among the control variables. I also include the ratio of deposits to total assets because banks still heavily rely on deposits, including those banks that are regarded as severely diversified banks. I also include the amount of securitized assets.

Furthermore, following DeYoung (2014), I include the ratio of full-time-employees-to-total assets as a proxy for personalized service or as a proxy for human error in the workplace. I significantly vary a number of control variables to capture various aspects of banks' performance. I also include banks' foreign loans to capture their exposure to foreign individuals, firms and governments. I also control for BHC complexity using the complexity indicators from the Fed database. The FED categorizes BHCs into various complexity categories.[18] Finally, I scale variables by the size of the BHC.

RELROE may reflect things other than bank management quality, such as the local competitive, economic, and regulatory conditions faced by the bank during the past three years. However, I expect that the time dummies and state dummies in my regressions should absorb much of this variation.

[18]As noted on the FRB's website, for small BHCs with total consolidated assets of $5 billion or less, attributes rows with date starting on or after 01/01/2002 must use values from 3 to 8 for complex institutions. A value of 2 should be used for any size company to indicate noncomplex institutions, unless there are factors that indicate complexity and that have been overridden by supervisory judgment, in which case a value of 9 should be used. The complexity indicators are the following: 3 = Complex: Nonbank Financial Factors. Nature and scale of non-bank activities warrant designation as complex for supervisory purposes; 4 = Complex: High Risk Activities. Company engages, either directly or through its subsidiaries, in significant non-banking activity having an inherently high-risk profile. Examples include securities broker/dealer activities, insurance underwriting and merchant banking; other activities may also trigger this designation if identified by the supervisory Reserve Bank as high-risk in nature; 5 = Complex: Public Debt. Company issues significant debt to the general public such that unsophisticated investors may be at risk of loss; 6 = Complex: Management Factors. Management practices such as the nature of inter-company transactions or centralized risk management policies and procedures warrant designation as complex for supervisory purposes; 7 = Complex: Multiple Factors. Company meets two or more criteria for the complex designation, more than one of which are material in the judgment of the supervisory Reserve Bank. While the intensity of the supervisory approach may not differ from other complex companies, this

In one subsection where I analyze bank litigation, I also use the systemic risk measure MES from VLab linking it with the BHCs' data set from the Fed.

1.4 Summary Statistics

1.4.1 Non-interest expenses

Summary statistics for the main variables used in this study are reported in Table 1. In what follows, I present the distinguishing features of the BHCs' non-interest expenses.

I observe that compensation constitutes the highest non-interest expense, followed by other expenses on fixed assets and premises, data processing, and advertising and marketing expenses. For banks which report other "first highest", "second highest" and "third highest" expenses, these expenses can be as high as banks' expenditure on compensation. I sort other non-interest expenses and observe the following. In general, univariate findings show that litigation expenses are high in total magnitude, and they predominantly appear on the FR-9YC forms of the largest BHCs. The highest non-standardized other non-interest expenses are those of METLIFE, INC. in the amount of $35, 257.253 for "POLICY BENEFITS ON INSURANCE PRODUCTS". Metlife dominates the highest expenses. This seems natural because this is an insurance-based industry, and thus their expenses are likely to appear in other non-classified expenses.

Among the other highest expenses for large banks when not divided by bank size, I find that merger and acquisition, and restructuring costs constitute a significant part of all expenses for the Bank of America. Also, foreclosure expenses, operating losses and travel expenses are frequently mentioned by large and small banks.

Other significant "highest expenses" are those of American Express where card member rewards constitute a company's other highest expenditure. However, when I scale the above expenses by operating revenue, other ratios appear to dominate the overall picture of the highest expenses. I present the ratios because from the whole economy's perspective especially when one considers litigation settlements that accrue to the regulatory agencies or are repaid as compensation to victims of financial crime, while the ratios might be more interesting for inter-bank comparisons.

When I examine the expense ratios, I observe that for some BHCs among highest "other expenses" are underwriting and distribution expenses, death claims, travel expenses and entertainment, fraud losses, Office of the Comptroller of the Currency (hereafter OCC) fund, supervisory examination fees, reserves, compliance, charitable contributions; marketing and servicing fees on payday loans are also listed among the highest expenses. Among "other expenses", acquisitions fees, provision for government investigations and loss provision, and state franchise tax are also frequently mentioned.

Data on expenses also provide an insight into the occurring trends from 2001 to 2014. For example, I note that the number of full-time employees per dollar of operating income has fallen precipitously over time, while industry-wide labor expenses have declined only marginally and have actually increased at the average bank.

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designation alerts examiners to the presence of more than one factor; 8 = Complex: Supervisory Judgment. Company does not appear to be complex as described in SR 02-01, however, at the discretion of the supervisory Reserve Bank, it is designated as a complex organization for supervisory purposes.

These conflicting trends provide evidence that new banking products and production methods require a more highly skilled work force and, hence, higher salaries and benefits to attract and retain these workers. For example, while low-wage bank tellers have become less necessary due to ATMs and online banking, high-wage finance and information professionals have become more necessary to manage these systems and the growing array of products offered around them.

Data also reveal a stable upward trend in AME scaled by bank total assets from 2001 to 2014. I observe that during and after the 2007–2009 crisis in contrast to the number of employees and compensation or litigation expenses, AME have not exhibited any cyclical behavior, *i.e.* AME have not undergone any drastic cuts, and have been been relatively stable over the entire sample period with only a moderate decrease during the crisis.

As far as the complexity indicator is concerned, the majority of BHCs in my sample are classified as non-complex institutions, *i.e.* 171,908 observations are of Complexity=2; 5,895 are Complexity=9; 2,179 are BHCs which have Complexity=6; 978 are Complexity= 8; 1,084 are Complexity=7.

Among other features, univariate statistics show significant differences between small and large banks. For example, small BHCs received over 60 percent of their nontraditional income from investment banking. In contrast, medium and large BHCs relied upon trading revenue, investment banking and insurance income to roughly the same extent. Further, net interest income from trading assets is substantially higher for medium and large BHCs relative to small ones. I also find that the MES was higher for larger banks.

1.4.2 Litigation

Summary statistics for banks involved in litigation and those which were not involved in litigation are presented in Table 2. In Table 3a. I observe that 2004 was a relatively litigious year in terms of the magnitude of litigation settlements. Then from 2004 onward up to the financial crisis, there was relatively little litigation followed by a boom of litigation after 2008. In particular, I observe an unprecedented average litigation amount from 2010 onward. Recent evidence in the press shows that 2014 has been even more litigious; however my data sample ends at 2014. What I do observe in Table 2a is that some banks face litigation settlements continuously over many quarters.

As for the litigation sample, I have 341 litigation occurrences with 118 BHCs involved in them. One limitation on carrying out a more thorough analysis is that FR-9YC forms do not have standardized entries to report why some litigation settlements have occurred; only two or three entries provide detailed information. I also note that in my analysis I focus only on monetary costs because it is impossible to capture other costs (e.g. prohibition for banks to pay out dividends or any other non-monetary punishment or losses from pending litigation that may also prevent banks from engaging into profitable businesses or raising debt).

Hence, I have 118 banks that paid litigation settlements one or more times and which were a significant, *i.e.* more than 10 percent of other highest non-interest expenses, amount of their expenses and thus were reported in 9-YC forms, BHCs that appear to be continuously facing significant litigation settlements include: Discover Financial Services, Goldman Sachs, First Bancorp of Durango, Chinatrust Corp. or CTBC Capital Corp., Synovus Financial Corp., CIB Marine Bancshares Inc., International Bancshares Corp., Citigroup Inc., Bank

of America Corp. (primarily claims from the financial crisis tied to the sale of mortgage-backed securities that defaulted) and JPMorgan Chase&CO.

1.5 Methodology

To examine the relationship between banks' size and their operating costs, I estimate regressions with BHC-fixed effects, and time dummies. Thus I examine only changes in size within BHCs. I use fixed effects to capture characteristics specific to the banks that are fixed; for example, a bank's culture. I also cluster error terms at the BHC level to allow for correlation in the error terms within the BHCs. I also follow previous studies (e.g. Stiroh, 2006; Affinito and Tagliaferri, 2010; Casu et al., 2011) and have my explanatory variables lagged one period to relax potential problems of endogeneity.

The model specification is as follows:

$$ExpenseRatio_{??,??} = ??_i*(Size)_{i,??-1} + ??_{??}*(Controls)_{??,??-1} + q_t + v_i + ??_{??,??} \quad (1)$$

I begin with standard control variables and then I control for more factors such as the composition of BHC assets, the composition of revenue, funding structure, concentration and banks' complexity.

I then proceed to the litigation regressions.

I estimate several probit and logit regressions to examine the likelihood that banks with certain characteristics will engage in more wrongdoing and be detected.

$$Pr(Litigation=1) = ??i*(Size)i,??-1 + ??j*(Controls)_{??,??-1} + qi,t + ????,t \quad (2)$$

I also run simple panel regressions with BHC-fixed effect and time dummies clustered at BHC level to see whether litigation settlements increase with bank size.

$$LitigationAmount_{??,??} = ??i*(Size)_{i,??-1} + ??j*(Controls)_{??,??-1} + q_{i,t} + v_{i,t} + ??_{??,??} \quad (3)$$

My control variables include banks' size, profitability, leverage, credit risk, capital level, portfolio risk (risk-weighted assets), auditing fees as higher expenditures in auditing may diminish litigation risk, employees to total assets ratio, compensation in banks, because more workers are likely to reduce strategic errors and better paid workers may have more incentives to exert more effort, and opacity levels and complexity levels. I also include foreign loans since dealing in foreign jurisdictions can significantly affect legal risk.[19] Among other variables, I include securitized assets because they have been at the center of the recent litigation debate surrounding mortgage markets.

I examine banks' characteristics and examine whether the negative change in some of them stimulates banks to engage in financial wrongdoing as a means of boosting their performance. For instance, the corporate fraud

[19] Legal risk is subsumed in operational risk. Examples of operational risk events include the Nasdaq odd-eighths pricing scandal in 1994, the 1995 bankruptcy of Barings Bank due to a rogue trader, the brokerage firm conflict of interest scandal in 2002, and the 1990s fines and lawsuits against Prudential Financial for misleading sales presentations. In response to these and other events, major institutions have been developing sophisticated operational risk measurement and management systems. The Basel Committee on Banking Supervision has also incorporated a new minimum capital charge for operational risk as part of the Basel II Capital Accord (Basel Committee, 2001), and major ratings firms have begun to consider operational risk in assigning corporate financial ratings (Moody's Investors Service, 2003).

literature suggests that a firm's risk might relate to a firm's tendency to commit wrongdoing. Many cases of misconduct are discovered when bank fundamentals indicate increased risk. For example, Povel et al. (2007) argue that CEOs of high-growth firms that exhibit a downturn are more likely to commit financial misconduct. Thus, I control for portfolio risk and systemic risk. In addition, some studies document that more systemically risky BHCs or banks with higher returns volatility or stock turnover may induce supervisors to monitor these banks more closely (Wang, 2013); thus I include stock returns and returns volatility to account for the probability of higher detection. In addition, I estimate other regressions that may provide some further insight into bank litigation issues. For example, it has been noted that litigation and uncertainty surrounding potential liability may depress a bank's stock price. Therefore, I regress BHC stock prices on their litigation settlements.

1.6 Results

1.6.1 Economies of scale

In Table 4 the coefficient of non-interest expense is negative and statistically significant, which which shows that there are significant economies of scale for large banks. In particular, when I disaggregate expenses, I find that larger BHCs enjoy lower Compensation, Expenses on Premises and Fixed Assets, Data Processing Expenses, Directors Fees, Postage Expenses, Accounting and Auditing Expenses, Consulting and Advisory Expenses and Legal fees (all coefficients are negative and statically significant).

Some results are intuitive. For example, large BHCs can enjoy lower postage expenses, consulting or auditing, or data processing, because large BHCs are able to spread the fixed component of these costs over a larger total base of operating revenue or total assets. As for legal expenses, many large BHCs have their own legal departments and thus it is normal that their expenses are lower compared to those of smaller BHCs that have to use external legal services. The negative coefficient on compensation is however surprising. Large banks enjoy economies of scale in compensation that is a significant part of the total non-interest expenses. I did not expect to observe economies of scale on compensation.

As for other results, I observe diseconomies of scale in the following areas: amortization and goodwill expenses, FDIC deposit insurance assessments, printing and stationery supplies and AME. For the first two categories, I do not have any economic interpretation of why this might be the case. However, for FDIC insurance premiums assessments, it is possible that FDIC takes into account the possible contagion risk stemming from the large banks, implicit "too big to fail" guarantees and relaxed market monitoring of large banks, resulting in higher premiums being charged to these banks. This however changes once I include deposits (the estimated coefficient remains negative although not statistically significant). This coefficient is likely to shrink further if my regression specification includes a control for the fraction of insured deposits, rather than total deposits. As for AME, the fact that larger banks have higher AME may be because reputation may play a huge stake and thus big banks choose to have expensive billboards and flashy logos.

To conclude, I observe significant economies and diseconomies of scale for large BHCs once I split expenses into sub-categories. Overall, I cannot conclude that bank expenses will skyrocket if large banks are split into smaller banks. These results remain robust after I include more control variables (Tables 5 and 6).

I emphasize that a number of caveats apply to my results. My reduced form of statistical correlations supports the existence of significant economies of scale in the banking sector. Caution, however, should be exercised when drawing a causal interpretation from them. Although my regressions control for a wide range of BHC characteristics, firm size may still correlate with omitted variables that are also associated with lower expenses, such as the quality of management, since above average profitability might not fully capture the quality of management. This caveat however also seems to apply more generally to the existing literature on scale economies in banking.

1.6.2 Litigation

I find that larger BHCs are more often involved in litigation settlements. Regarding BHCs' characteristics and litigation, I find that size is the only variable which would be associated with the probability of facing litigation charges as well as higher litigation settlement amounts, and it is robust across all specifications (probit and logit and OLS regressions in Tables 7- 9).

That is, in contrast to the legal fees, which decrease as banks grow in size, I find that litigation settlements relate positively to bank size, which means that large banks face larger penalties. This contradicts the statements that larger banks continuously avoid charges or face lower punishment. Certainly, to examine this issue in more detail and address Dudley's statements that large banks often could avoid all charges for all their wrongdoing, I would need to have data on the reasons why banks faced these charges. Regrettably, this is limited by data availability as only a small number of banks fill this information into "other expenses" on FR-9YC forms.

In turn, in Table 7, I also find that systemic risk is positive and statistically significant in litigation regressions. That is, more systemically risky banks are also more likely to be involved in misconduct.

In Table 9, I also find that a higher foreign loans ratio increases the litigation amount. This may be because banks lending to other banks are exposed to the rules of foreign jurisdictions and naturally face higher uncertainty. I also observe that the litigation amount significantly increases with investment banking income and insurance related activities such as fiduciary income (Table 8 and Table 9). This is intuitive as investment banking and insurance activities are more complex activities than for example simple deposit taking and thus they carry more legal risk. Interestingly and contrary to my expectations, opacity (the bid–ask spread) is not significant in litigation regressions (Table 8). This result is an avenue for future study.

I also observe that banks that have a higher credit risk (*i.e.* non-performing loans) have higher litigation costs, which may be an indication that banks that have a higher credit risk engage in more wrongdoing (Tables 7-9*)*. This may seem intuitive if for example banks that have more non-performing loans anticipated that these non-performing loans would turn into charge-offs and banks are trying to engage in some activities to generate higher revenues to cover potential future losses. I also find that BHCs with more employees have a lower risk of facing litigation charges. This may indicate that more workers reduce human error or that more employees may provide better monitoring and better discipline within the bank; consequently, the bank faces fewer litigation charges. In addition, higher compensation is also negatively correlated with litigation settlement

amounts, which from the perspective of operational risk suggests that more workers and better paid workers may reduce errors in the bank and reduce the amount of litigation settlements (Table 8).

I also observe that when small banks face litigation charges these are usually smaller than charges faced by large banks, possibly indicating that small BHCs engage in less severe wrongdoing since they do not have the "too big to jail" implicit cover; high fines may force them straight into terminating their businesses (Tables 7-8). In addition, I find that higher legal fees correlate negatively with litigation settlements, which suggests that it may be worth hiring more expensive lawyers (7); however, results are not persistent across different specifications. Overall, it seems reasonable to conclude that litigation is the new cost of doing business and it is important to account for it when considering the design of new financial regulations.

1.7 Robustness Checks

The efficiency ratio may be distorted in periods when net operating income is temporarily low, such as for example during the 2007–2009 crisis. Therefore, I test the sensitivity of my results to other normalizations of non-interest expenses, for example, by dividing the expenses by the level of capital. However, the results remain unchanged.

As for the litigation section of this chapter, my major concern is the sample selection bias and the assumption that the detection of bank misconduct is perfect. That is, I can only observe the detected misconduct (once an enforcement action has been issued), but not the population of all committed cases of misconduct. This has also been pointed out by Zingales et al. (2010). They note that by focusing on discovered frauds, two biases are introduced. First, I do not observe frauds that were committed but which were never detected. Second, I do not observe fraud which was detected but which never entered the public domain. Also, since the data available are only about the cost of the litigation, I cannot draw any conclusions as to whether banks were punished proportionately to the severity of their committed crime. However, Zingales et al. (2010) note that the intense public scrutiny of large U.S. firms, the ability to go back in time and sue based on past wrongdoing, and the strong incentives to sue by plaintiff lawyers is likely to diminish this problem. Therefore, there is so much one can do about it other than rely on efficiency of plaintiff lawyers and on the intense public scrutiny and hope that the detection of the bank misconduct is nearly perfect.

Finally, I drop the 67 observations from my sample that have negative entries for expenses and rerun the regressions. This procedure does not result in significant changes in the coefficients of interest.

1.8 Conclusion

Legislative changes over the past decades have been conducive to BHCs becoming more complex by expanding in size and scope, as well as to increased engagement in cross-border and cross-state businesses.

Following the recent financial crisis, there is still widespread concern that large banking firms remain "too big to fail". There is no consensus, however, among the bank researchers on the optimal size of banks, and no clear evidence as to what effect imposing a cap on bank size will have on bank operating revenues.

Control of expenses remains a high priority as regulatory costs continue to rise. Therefore, in this chapter I describe the typical structure of BHCs non-interest expenses and examine the areas in which large banks

enjoy significant economies of scale. These are the benefits that could be lost if limits on bank size are imposed.

My findings show that overall, large banks enjoy economies of scale. In particular, significant economies of scale are found in auditing, consulting and legal fees, as well as expenses on fixed assets and premises, compensation and data processing. These economies of scale are likely to be lost once banks are split up. I also show that not all costs decrease as banks grow in size. Therefore, the argument that breaking up big banks will result in skyrocketing operating costs may be exaggerated. In addition, I observe diseconomies of scale in amortization expenses, goodwill, FDIC insurance premiums, printing and stationery supplies and AME.

What seems evident is that technological progress and investment in technologies may face difficult times. This is because it was predominantly large banks that invested in innovation as they had a large client base and resources to invest. If large banks are split into parts, technological progress might be more challenging to achieve.

Limiting the size of banks could be an appropriate policy goal, but only if the benefits of doing so exceeded the attendant reductions in scale economies, *e.g*. if systemic risk is significantly reduced.

Another important aspect in this discussion is whether this loss in economies of scale would constitute a deadweight economic loss. Unfortunately, this is a challenging aspect to evaluate. There is a possibility that large banking firms have a greater bargaining power vis-à-vis their suppliers and employees. Thus, they can enjoy lower operating costs. If cost differences are due only to bargaining power effects, then limiting the size of the largest BHCs would not necessarily generate deadweight economic loss, but would rather simply constitute a redistribution of resources from banks to the employees or external suppliers of banking services.

As far as litigation risk is concerned, litigation costs play an important role in the discussion of breaking up "too big to jail" BHCs. My findings indicate that large banks face a higher probability of litigation risk, however, it is too early to affirm that litigation risk will decrease if the banks are broken up into bits.

Misconduct in banking undermines the general public's confidence in the safety and soundness of the banking sector. Thus, it seems rational to make those who were ultimately responsible for what went wrong in the bank personally liable for their mistakes so that the tab is not simply picked up by shareholders. In other words, instead of breaking up big banks, it seems more rational to impose harsher individual penalties for bankers to discipline them and generally to encourage more integrity in the banking sector until more data is gathered. In addition, personal liability is likely to reduce banks' legal fees if bankers who are guilty for the financial misconduct of the banks had to pay these fees out of their own pockets.

In general, the determinants of a bank's misconduct is an important topic, which has wider implications for the broader economy. It would be interesting to examine whether various litigation charges and settlements have been proportionate to the severity of the misconduct, and whether large banks have been treated more favorably than smaller banks. As noted by Judge Rakoff (2015), there is usually a lack of proportionality between the fine imposed and the company's annual profits. That topic is an avenue for future research when data becomes available.

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Appendix 1

Table 1 - Summary statistics expenses

1 Variable	2 Obs	3 Mean	4 Std. Dev.	5 Min	6 Max	7 Mean ratio
Compensation	75610	96440.25	950401.1	0	3.70e+07	.3641608
Premises Fixed Assets	75604	21722.34	206761	0	8290000	.0933336
Amortization	67987	4239.423	49875.96	0	2578000	.0052985
Goodwill	67946	2642.991	134974.9	0	2.48e+07	.0049724
Data Processing	67254	5054.459	72099.8	0	4482000	.0228452
Advertising Marketing	67008	6532.368	83678.11	0	3147001	.0127717
Director Fees	66578	60.33284	184.3265	0	24879	.0034494
Printing Stationery	66836	726.5661	18359.98	0	1195000	.0058384
Postage	66535	1035.279	17132.87	0	995443	.0036994
FDIC deposits	45518	109.9999	3289.532	0	429941	.0021243
Accounting Audit	25444	252.958	2542.272	0	175000	.0062782
Consulting Advisory	25447	7301.448	117321.3	0	5613000	.0077305
ATMs & int	25430	383.4751	2973.58	0	343292	0.0073766
Telecommunication	25449	3928.305	59885.7	0	4573000	0.0084702
Legal Exp	66427	1519.31	28289.14	0	2639000	0.0064727
1st Highest Oth Exp	61600	27677.97	542624.3	0	3.53e+07	0.374028
2nd Highest Oth Exp	53861	11322.69	140081.1	0	7406000	0.2858667
3rd Highest Oth Exp	48793	5968.099	73882.97	0	3892000	0.1938448

Note: This table reports the variable's name, mean, standard deviation, minimum- and maximum value of the individual BHC's time-series averages, and number of observations.

Table 2 - Summary statistics for BHCs involved and not involved in litigation

1	2	3	4	5	6	7	8	9	10	11
			Litigation=0					Litigation=1		
Variable	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Size	75279	8287896	7.17e+07	7071	2.37e+09	341	3.76e+08	7.36e+08	164797	2.46e+09
Capital	72995	13.38682	13.35549	.03	1581	324	12.71725	6.777708	1.02	62.56
NPL	73303	8.355874	2.083561	0	18.11211	331	11.51087	3.491519	.6931472	18.12966
Trading Revenue	74780	10413.03	303899.5	-2.62e+07	2.34e+07	339	1017138	2838635	-9791000	1.98e+07
Net Operating Revenue	74561	276300.4	2616855	-18912	1.10e+08	336	1.08e+07	2.23e+07	2896	1.00e+08
Non-interest Expenses	75269	177948.5	1687383	0	8.28e+07	341	7525112	1.59e+07	2041	8.01e+07
Efficiency ratio	74558	.6823939	.2143139	-8.212121	12.16838	336	.7593116	.4116059	.2337783	6.63896
Legal Expenses ratio	65400	.0064306	.0170324	-.7149621	1.316802	315	.015206	.0302485	0	.2505489
Telecommunication Expenses ratio	24587	.0084701	.0075394	-.0117451	.1985158	194	.0084888	.0072642	0	.037803
ATMs Expenses ratio	24568	.0073988	.0115216	-.0061599	.1782112	194	.0045572	.0134489	0	.0755277
Consulting Advisory ratio	24584	.0076742	.0152673	-.2149621	.6175857	194	.0148592	.018506	0	.0721549
Accounting Audit ratio	24581	.0062886	.0097963	-.061368	.8739195	194	.004956	.0083302	0	.051311
FDIC deposits ratio	45227	.0021179	.0087006	-.5975379	.3167956	173	.0037972	.0082395	0	.0437919
Postage ratio	65507	.0037051	.0058237	-.0030697	.1157148	316	.0025144	.0042393	0	.0185767
Printing Stationery Expenses ratio	65808	.0058477	.0071442	0	.1034483	316	.0038925	.0063412	0	.0443821
Director Fees ratio	65551	.0034574	.0065218	0	.3597786	315	.0017957	.004389	0	.025018
Advertising Marketing ratio	65985	.0127467	.0130098	0	.2111835	316	.0179922	.0160383	0	.0851704
Data Processing Expenses ratio	66224	.0228525	.0292929	-.1714015	4.237705	318	.0213154	.0193271	0	.0950718
Goodwill I ratio	66913	.0047906	.0885366	0	6.116233	317	.0433404	.367834	0	6.06672
Amortization Expenses ratio	66954	.0052831	.0169311	-.0121455	2.838158	317	.0085507	.010162	0	.0612818

1	2	3	4	5	6	7	8	9	10	11
	Litigation=0					Litigation=1				
Variable	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Premises Fixed Assets ratio	74544	.0933528	.0367087	-.5767046	2.315182	336	.0890758	.0376916	.0187872	.2381724
Compensation Expenses ratio	74559	.3642402	.0908435	-2.033144	6.036655	336	.3465381	.0978769	.1200493	.7290925
Non-interest Expense ratio	74558	.6823939	.2143139	-8.212121	12.16838	336	.7593116	.4116059	.2337783	6.63896
1st Highest Oth Exp ratio	40241	.3759505	.5693862	-3.872159	13.24824	336	.1437865	.2514334	.0000288	1.944388
2nd Highest Oth Exp ratio	26242	.287942	.4552278	-4.776515	13.22171	299	.1037187	.1916743	.0000134	1.628918
3rd Highest Oth Exp ratio	14755	.195432	.3257018	1.870	10.00693	208	.0812534	.1505938	.0000121	.8956813
Employees ratio	75279	.0003077	.0003474	0	.0311525	341	.0002451	.0001691	.0000246	.002012
Trading Income ratio	74061	.0020066	.0228647	-1.422907	.6141494	334	.02578	.0676629	-.149044	.542329
Investment Banking income ratio	28467	.0071592	.0476521	0	1.029981	210	.0250479	.044015	0	.300574
Other Income ratio	65318	.0065406	.0163351	0	.8001625	315	.0032954	.0061996	0	.0434195
Total Deposits ratio	72263	.7891008	.1120842	0	.9979186	328	.6787587	.1666667	.0385794	.9124814
Foreign Loans ratio	74817	.0002949	.0041888	0	.2656964	339	.001889	.003892	0	.0169343
Litigation settlements ratio						341	572726.3	1533824	47	1.11e+07

Note: This table reports the variable's name, mean, standard deviation, minimum- and maximum value of the individual bank time-series averages, and number of observations. This is done per observation, grouped by bank which have litigation settlements reported in the 9-YC forms and which do not at any point in time in the sample period of 2001Q2 to 2013 Q4.

Table 3 - Correlation matrix

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Variables	**Size**	**Efficiency**	**Compensation**	**Premises Fixed Assets**	**Amortization**	**Goodwill I**	**Data Processing**	**Advertising Marketing**	**Director Fees**	**Printing Stationery**	**Postage**	**FDIC insurance**	**Accounting Audit**	**Consulting Advisory**	**ATMs&int**	**Telecommunication**
Size	1.0000															
Efficiency	-0.0133*	1.0000														
Compensation	-0.1376*	0.7135*	1.0000													
Premises Fixed Assets	-0.1055*	0.6110*	0.5281*	1.0000												
Amortization	0.1474*	0.1500*	0.0040	0.0813*	1.0000											
Goodwill I	0.0458*	0.4957*	0.0402*	0.0727*	0.0611*	1.0000										
Data Processing	-0.0741*	0.1784*	0.1159*	0.0838*	0.0140*	0.0130*	1.0000									
Advertising Marketing	0.1122*	0.1333*	0.1264*	0.1154*	0.0137*	0.0099	0.0818*	1.0000								
Director Fees	-0.2234*	0.0688*	0.0883*	0.0512*	-0.0358*	0.0075	0.0713*	0.0506*	1.0000							
Printing Stationery	-0.2254*	0.1136*	0.1538*	0.1910*	-0.0033	0.0090	0.0452*	0.1462*	0.2044*	1.0000						
Postage	-0.0224*	0.0653*	0.0671*	0.0687*	0.0178*	0.0049	0.0297*	0.1603*	0.1440*	0.3574*	1.0000					
FDIC insurance	0.0240*	0.3250*	0.2141*	0.1949*	0.0109	0.0638*	0.0918*	0.0488*	0.0895*	0.0911*	0.1175*	1.0000				
Accounting Audit	-0.2758*	0.2833*	0.2634*	0.2722*	-0.0412*	0.0257*	0.1231*	-0.0439*	0.2327*	0.1097*	0.0202*	0.2542*	1.0000			

Consulting Advisory	0.0927*	0.2382*	0.1549*	0.1493*	0.0696*	0.0579*	0.0666*	0.0295*	-0.0023	-0.0549*	-0.0401*	0.2270*	0.1329*	1.0000		
ATMs & int	-0.1492*	0.0108	0.0226*	0.0292*	-0.0257*	-0.0284*	-0.0346*	0.0300*	0.0398*	0.1301*	0.1698*	-0.0058	0.0201*	-0.0123	1.0000	
Telecommunication	-0.0892*	0.2609*	0.3057*	0.3811*	0.0522*	0.0461*	-0.0309*	0.0641*	0.0654*	0.2360*	0.1978*	0.0567*	0.1912*	0.0517*	0.1449*	1.0000

Note: The table reports pairwise correlations between the main regression variables. * indicates significance at 1%. For the definition and construction of the variables see Appendix 1.

Table 4 - BHCs' expenses and size

1 Variables	2 Non-Interest Expense	3 Compensation	4 Premises Fixed Assets	5 Amortization	6 Goodwill Imp.losses	7 Data Processing	8 Advertising& Marketing	9 Director Fees	10 Printing & Stationery
Size	-0.0806*** (0.013)	-0.0457*** (0.005)	-0.0150*** (0.002)	0.00590*** (0.001)	0.0228*** (0.005)	-0.00581*** (0.001)	-0.000826 (0.001)	-0.00975*** (0.002)	-0.0146*** (0.003)
Constant	1.721*** (0.175)	0.955*** (0.072)	0.293*** (0.029)	-0.0722*** (0.008)	-0.305*** (0.062)	0.0967*** (0.013)	0.0229*** (0.007)	0.0148*** (0.003)	0.0258*** (0.004)
Observations	71,623	71,625	71,610	65,968	65,926	65,263	65,026	64,599	64,849
R-squared	0.066	0.074	0.039	0.010	0.010	0.014	0.021	0.050	0.047
Number of BHCS	3,008	3,008	3,008	2,926	2,926	2,925	2,924	2,925	2,925

(continued below)

1 Variables	11 Postage	12 FDIC deposit ins.ass.	13 Accounting & Audit	14 ATMs	15 Telecommunications	16 Legal Fees
Size	-0.0105*** (0.002)	0.00323*** (0.001)	-0.00263*** (0.001)	-0.00244** (0.001)	-0.000347 (0.001)	-0.00519*** (0.001)
Constant	0.0169*** (0.003)	-0.0448*** (0.001)	0.0413*** (0.009)	0.0357** (0.016)	0.0111 (0.007)	0.0722*** (0.015)
Observations	64,558	44,515	24,280	24,283	24,287	64,453
R-squared	0.092	0.239	0.014	0.021	0.007	0.048
Number of BHCs	2,924	2.659	1,442	1,442	1,442	2,925

Note: The table presents an analysis of the relationship between size, measured by log of total assets, and efficiency ratio, defined as total non-interest expense normalized by net operating revenue. All explanatory variables are lagged by one quarter. Revenue composition variables are the rolling average for the absolute value of the income share over net operating revenue. See Appendix 1 for further detail on controls included in the models. Models are estimated with robust standard errors and two-way

clustering by firm and quarter. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and *** respectively, and standard errors are reported below the coefficients in parentheses.

Table 5 - BHCs' expenses and size

1 Variables	2 Non-Interest Expense	3 Compensation	4 Premises & Fixed Assets	5 Amortization	6 Goodwill Imp. losses	7 Data Processing	8 Advertising & Marketing	9 Director Fees
Size	-0.0860*** (0.011)	-0.0461*** (0.004)	-0.0155*** (0.002)	0.00651*** (0.001)	0.0244*** (0.005)	-0.00564*** (0.001)	-0.000514 (0.001)	-0.0124*** (0.002)
Non-performing loans	0.0189*** (0.002)	0.00322*** (0.001)	0.225*** (0.027)	0.135* (0.007)	0.00113 (0.001)	-0.0015 (0.005)	-0.00465*** (0.001)	0.00642 (0.004)
Profitability	-7.204*** (0.808)	-1.512*** (0.168)	-0.639*** (0.078)	-0.0870*** (0.013)	-2.175*** (0.569)	-0.204*** (0.060)	-0.00698 (0.011)	0.00713** (0.003)
Capital	-5.140 (4.740)	5.880 (0.199)	-1.770 (1.130)	-5.760* (3.430)	2.560 (2.250)	3.130 (5.810)	1.770 (1.620)	-1.990 (1.760)
Constant	1.668*** (0.136)	0.938*** (0.052)	0.285*** (0.022)	-0.0799*** (0.008)	-0.321*** (0.066)	0.0965*** (0.016)	0.0223*** (0.008)	0.0176*** (0.003)
Observations	67863	67865	67851	62726	62731	62063	61875	61481
R-squared	0.175	0.124	0.105	0.012	0.034	0.017	0.024	0.052
Number of BHCs	2817	2817	2817	2733	2732	2734	2731	2732

(continued on the next page)

1 Variables	2 Printing & Stationery	3 Postage	4 FDIC depositinsass	5 Accounting & Audit	6 Consulting & Advisory	7 ATMs	8 Telecom
Size	-0.0163*** (0.003)	-0.0103*** (0.003)	0.00198*** (0.001)	-0.00310*** (0.001)	-0.00320*** (0.001)	-0.00236*** (0.001)	-0.000215 (0.001)
Non-performing loans	0.0122 (0.472)	-9.900* (0.527)	0.0106*** (0.001)	0.292*** (0.009)	0.00555*** (0.001)	0.00203 (0.001)	-0.291 (0.818)
Profitability	-0.00194 (0.005)	0.00527 (0.005)	-0.222*** (0.067)	-0.0238** (0.010)	-0.0886*** (0.024)	-0.00608 (0.005)	-0.0152** (0.007)
Capital	-0.471 (0.938)	-0.773 (0.943)	-0.585 (0.131)	-0.708 (0.257)	0.131 (0.114)	0.345 (0.232)	-0.310 (0.282)
Constant	0.0278*** (0.004)	0.0169*** (0.003)	-0.0343*** (0.009)	0.0453*** (0.010)	0.0428** (0.017)	0.0321*** (0.010)	0.00836 (0.008)
Observations	61702	61441	42543	23125	23128	23116	23132
R-squared	0.05	0.096	0.283	0.018	0.032	0.044	0.009
Number of BHCs	2731	2731	2589	1309	1309	1309	1309

Note: The table presents an analysis of the relationship between size, measured by log of total assets, and efficiency ratio, defined as total non-interest expense normalized by net operating revenue. All explanatory variables are lagged by one quarter. Revenue composition variables are the rolling average for the absolute value of the income share over net operating revenue. See Appendix 1 for further detail on controls included in the models. Models are estimated with robust standard errors and two-way clustering by firm and quarter. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and *** respectively, and standard errors are reported below the coefficients in parentheses.

Table 6 - BHCs' expenses and size

1 Variables	2 Efficiency Ratio	3 ATMs	4 Telecom.	5 Consulting & Advisory	6 Accounting & Audit	7 FDIC insurance	8 Postage
Size	-0.0616** (0.026)	-0.00274*** (0.001)	-0.000158 (0.001)	-0.00393*** (0.001)	-0.00329*** (0.001)	-0.00340 (0.003)	0.00334 (0.003)
Non-performing loans	0.0207*** (0.003)	0.00172 (0.001)	-1.990 (8.200)	0.00604*** (0.002)	0.00265** (0.001)	0.00829*** (0.003)	-2.700 (4.980)
Profitability	-6.761*** (0.835)	-0.00197 (0.005)	-0.0112 (0.007)	-0.0879*** (0.025)	-0.0238** (0.012)	-0.422*** (0.118)	0.00442 (0.003)
Capital	-0.00129 (0.002)	3.280 (2.340)	-3.180 (2.790)	1.140 (0.975)	-1.750 (2.830)	-9.300 (1.310)	6.880 (1.420)
Total Deposits ratio	0.0652 (0.088)	0.00311 (0.006)	0.000609 (0.002)	-0.00238 (0.005)	0.00161 (0.002)	0.0250** (0.011)	-0.00587** (0.002)
Trading Assets ratio	-0.0856 (0.176)	-0.00303 (0.007)	-0.000370 (0.011)	0.0286 (0.021)	-0.000896 (0.005)	-0.00379 (0.017)	0.00240 (0.004)
Investments Real Estate Vent.	0.627*** (0.220)	-0.0109 (0.007)	-0.00490 (0.006)	0.0112 (0.008)	0.0171*** (0.006)	-2.869*** (0.771)	0.000940 (0.004)
Total Loans ratio	-0.290*** (0.051)	-0.00267 (0.002)	-0.00116 (0.001)	-0.00642** (0.003)	-0.00504*** (0.002)	-0.0321** (0.015)	0.00117 (0.001)
Trading Income ratio	-0.0843 (0.171)	0.00212 (0.002)	-0.00732 (0.007)	0.00140 (0.010)	0.000188 (0.003)	0.0145 (0.014)	-0.00498** (0.002)
Fiduciary Income ratio	0.491*** (0.098)	-0.00235 (0.005)	0.00897** (0.004)	0.00380 (0.010)	-0.000292 (0.004)	0.00319 (0.013)	0.000381 (0.003)
lnvestment Banking Income ratio	0.374** (0.183)	0.00178 (0.008)	0.0130 (0.013)	0.0237 (0.019)	0.000420 (0.006)	0.00393 (0.022)	-0.0118*** (0.003)
Other Income ratio	1.455***	0.0798***	0.0387***	0.0109	0.0433***	0.0420	0.0432***

	(0.301)	(0.031)	(0.011)	(0.015)	(0.011)	(0.036)	(0.008)
Employees ratio	322.1***	-7.816**	-0.395	-5.612	-2.871	-4.361	1.949
	(100.2)	(3.736)	(2.308)	(7.265)	(3.120)	(9.373)	(3.973)
Constant	1.404***	0.0390***	0.00728	0.0604***	0.0512***	-0.0248	0.00283
	(0.402)	(0.012)	(0.009)	(0.023)	(0.012)	(0.046)	(0.006)
Observations	24,341	21,501	21,516	21,512	21,509	7,471	24,341
R-squared	0.115	0.056	0.016	0.035	0.026	0.371	0.139
Number of BHCs	1,337	1,289	1,289	1,289	1,289	1,046	1,337

(continued on next page)

Note: The table presents an analysis of the relationship between size, measured by log of total assets, and efficiency ratio, defined as total non-interest expense normalized by net operating revenue. All explanatory variables are lagged by one quarter. Revenue composition variables are the rolling average for the absolute value of the income share over net operating revenue. See Appendix 1 for further detail on controls included in the models. Models are estimated with robust standard errors and two-way clustering by firm and quarter. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and *** respectively, and standard errors are reported below the coefficients in parentheses.

1 Variables	9 Printing & Stationery	10 Director Fees	11 Advertising & Marketing	12 Data Processing	13 Goodwill Imp.losses	14 Amortization	15 Premises & Fixed Assets	16 Legal Fees
Size	0.0158*** (0.004)	-0.00221 (0.003)	0.00550*** (0.001)	-0.00430** (0.002)	0.0617*** (0.019)	0.00612*** (0.001)	-0.0151*** (0.004)	-0.00948*** (0.002)
Non-performing loans	-1.000* (0.568)	-6.340 (5.370)	-0.00453*** (0.001)	0.00660*** (0.002)	0.00236 (0.002)	0.00222** (0.002)	0.0241*** (0.004)	0.0160*** (0.002)
Profitability	0.00970* (0.005)	0.00498 (0.004)	0.000936 (0.008)	-0.0771*** (0.018)	-2.943*** (0.815)	-0.0557*** (0.014)	-0.392*** (0.069)	-0.128*** (0.024)
Capital	2.480 (1.900)	2.060 (1.790)	9.160** (4.510)	-3.910 (4.450)	5.720 (4.770)	-4.410 (4.807)	-7.890 (2.530)	-9.680 (7.500)
Total Deposits ratio	-0.00617*** (0.001)	-0.00297** (0.001)	-0.0100** (0.004)	0.0152*** (0.004)	-0.153** (0.075)	-0.00303 (0.003)	0.0344*** (0.010)	0.0142** (0.006)
Trading Assets ratio	0.00632 (0.007)	0.00153 (0.005)	0.00821 (0.010)	-0.0345** (0.015)	0.0252 (0.070)	0.000488 (0.010)	-0.00142 (0.026)	-0.00657 (0.025)
Investments Real Estate Vent.	0.00460 (0.005)	-0.00293 (0.003)	0.0141 (0.014)	-0.0369*** (0.009)	0.180 (0.192)	0.00571 (0.008)	0.0730*** (0.020)	-0.0824*** (0.018)
Total Loans ratio	0.00281*** (0.001)	0.00203** (0.001)	0.00197 (0.003)	-0.0131*** (0.003)	0.0919*** (0.030)	-0.00166 (0.002)	-0.0379*** (0.008)	-0.0206*** (0.004)
Trading Income ratio	-0.00713*** (0.003)	0.00141 (0.003)	-0.0129* (0.008)	0.00584 (0.006)	-0.0103 (0.034)	-0.000419 (0.006)	-0.0238* (0.014)	0.0152 (0.021)
Fiduciary Income ratio	0.00730** (0.003)	-0.000513 (0.002)	0.0117** (0.005)	0.0419*** (0.009)	0.00975 (0.072)	0.0204*** (0.008)	0.0776*** (0.016)	-0.00300 (0.009)
Investment Banking Income ratio	-0.00442 (0.006)	-0.00886** (0.004)	0.00121 (0.013)	0.0319* (0.018)	0.0123 (0.094)	0.00596 (0.018)	0.0502* (0.027)	0.0254 (0.031)
Other Income ratio	0.0445*** (0.009)	0.0198*** (0.007)	0.0191 (0.015)	0.0397 (0.029)	0.226 (0.167)	0.00552 (0.017)	0.288*** (0.053)	0.0663*** (0.019)

Employees ratio	0.360 (1.535)	-1.459* (0.813)	25.87*** (7.106)	-3.140 (5.561)	103.0 (77.030)	8.413** (3.475)	-14.46 (11.790)	-10.24 (12.630)
Constant	-0.0122* (0.007)	0.00716 (0.005)	-0.0583*** (0.016)	0.0693*** (0.025)	-0.818*** (0.283)	-0.0736*** (0.020)	0.286*** (0.058)	0.125*** (0.030)
Observations	24,341	24,340	24,341	24,340	24,341	24,318	24,341	24,341
R-squared	0.120	0.046	0.064	0.062	0.038	0.059	0.105	0.068
Number of BHCs	1,337	1.337	1,337	1,337	1,337	1,337	1,337	1,337

Table 7 - BHCs' size, systemic risk and litigation

1 Variables	2 Logit Litigation	3 Probit Litigation	4 OLS Litigation amount
MES	8.329 (6.384)	0.793*** (0.307)	-0.00462 (0.697)
Size	5.960** (5.55)**	1.430*** (0)	1.740*** (0)
Non-performing	0.645** (0.267)	0.00472 (0.005)	0.00997 (0.013)
Capital	-0.171 (0.118)	0.000720 (0.001)	0.000141 (0.002)
Profitability	-21.02 (22.420)	-0.637 (0.563)	-0.929 (0.626)
Constant	-11.71*** (3.538)	-0.0742 (0.065)	(0.073) -0.143 (0.173)
Observations	961	961	961
Number of	31	31	31
R-squared		0.07	0.139
Pseudo-R-squared	0.306	0.209	

Note: This table presents results from probit, logit and OLS regressions of litigation on BHCs' size and systemic risk. All explanatory variables are lagged by one quarter. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and *** respectively, and standard errors are reported below the coefficients in parentheses.

Table 8 - BHCs' size, opacity and litigation

1 Variables	2 Litigation (logit)	3 Litigation (probit)	4 Litigation amount (OLS)
Size	1.960*** (0.376)	0.0087*** (0.003)	7.025*** (0.09)
Non-performing loans	0.0933*** (0.036)	25.050 (50.616)	8.88*** (1.82)
ROLROE	5.661 (4.075)	1.338 (10.74)	6.588 (13.55)
Capital	0.00103 (0.003)	-11,721 (28.718)	34.21 (29.76)
Legal Fees ratio	181.2*** (59.150)	3.080 (3.133)	-4.538* (2.522)
Employees ratio	45.82 (503.30)	-2.287 (19.26)	
Trading Income ratio	0.798 (1.185)	7.687*** (2.770)	
Investment Banking Income ratio	4.108* (2.489)	1.189e+07** (0.522)	
Foreign Loans ratio		9.745e+07** (3.916e+07)	
Opacity		4.222 (24.891)	
Compensation			-4.802 (2.397)
Constant	-5.037*** (0.457)	-2.811 (8.630)	-1.183 (0.153)
Observations	26,915	1,070	2,880
Number of BHCs	1,373	34	96
Fixed effect			Yes
Time dummies	Yes	Yes	Yes
R-squared			0.601
Pseudo-R-squared	0.306	0.209	

Note: This table presents results from probit, logit and fixed effect regressions of litigation on BHCs' size, opacity and other variables. All explanatory variables are lagged by one quarter. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and *** respectively, and standard errors are reported below the coefficients in parentheses.

Table 4-9 - Litigation probit and logit

1 Variables	2 Litigation (logit)	3 Litigation (probit)	4 Litigation (logit)	5 Litigation (probit)
Size	4.680*** (0.940)	1.960*** (0.376)	0.503*** (0.077)	4.030*** (0.990)
Non-performing loans	0.194** (0.094)	0.0933*** (0.031)	-0.0474 (0.043)	-0.0747 (0.123)
Profitability	10.84 (8.993)	5.661 (4.075)	-0.0152 (4.061)	24.56 (16.880)
Capital	0.00274 (0.006)	0.00103 (0.003)	0.00140 (0.002)	-0.0186 (0.049)
Legal Fees ratio	437.6*** (146.300)	181.2*** (59.150)		603.7 (384.7)
Employees ratio	76.60 (1.382)	45.82 (503.3)	438.1 (453.6)	-5.786* (3,373)
Fiduciary Income ratio			-2.433** (1.159)	
Trading Income ratio	0.318 (2.545)	0.798 (1.185)	1.013 (1.246)	-2.372 (3.650)
Investment Banking Income ratio	12.67** (6.153)	4.108* (2.489)	-5.082** (2.554)	-14.47 (9.858)
Opacity				0.00597 (0.024)
Foreign Loans ratio			22.23** (9.426)	325.2*** (61.320)
Constant	11.98*** (1.056)	-5.037*** (0.457)	-10.962*** (1.005)	-6.399*** (1.669)
Observations	26,915	26,915	26,586	7,490
Number of BHCs	1,373	1,373	1,371	411

Note: The table presents results from probit and logit regressions of litigation on BHCs' size, opacity and other variables. All explanatory variables are lagged by one quarter. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and *** respectively, and standard errors are reported below the coefficients in parentheses.

Appendix 2

Table 1a - BHCs used in systemic risk regressions

1 Ticker	2 BHC Name
BAC	Bank Of America Corp
BBT	B B & T Corp
BK	Bank New York Inc
C	Citigroup Inc
CBH	Commerce Bancorp Inc Nj
CMA	Comerica Inc
HBAN	Huntington Bancshares Inc
HCBK	Hudson City Bancorp Inc
JPM	J P Morgan Chase & Co
KEY	Keycorp New
MI	Marshall & Ilsley Corp New
MTB	M & T Bank Corp
NCC	National City Corp
NTRS	Northern Trust Corp
NYB	New York Community Bancorp Inc
PBCT	Peoples United Financial Inc
PNC	P N C Financial Services Grp Inc
RF	Regions Financial Corp New
SNV	Synovus Financial Corp
STI	Suntrust Banks Inc
UB	Unionbancal Corp
USB	U S Bancorp Del
WB	Wachovia Corp 2nd New
WFC	Wells Fargo & Co New
ZION	Zions Bancorp
AMP	Ameriprise Financial Inc
AXP	American Express Co
BEN	Franklin Resources Inc
CBSS	Compass Bancshares Inc
COF	Capital One Financial Corp
FITB	Fifth Third Bancorp
SEIC	S E I Investments Company
ETFC	E Trade Financial Corp
GS	Goldman Sachs Group Inc
MS	Morgan Stanley Dean Witter & Co
SCHW	Schwab Charles Corp New
TROW	T Rowe Price Group Inc

Table 2a - Frequency of BHCs involved in litigation

1	2	3	4
Legal name	**Freq.**	**Legal name**	**Freq.**
1ST Centennial Bancorp	2	Heartland Financial USA, Inc.	1
Access National Corporation	6	Heritage Oaks Bancorp	2
ACNB Corporation	2	High Country Financial Corporation	2
Alliance Financial Services, Inc.	8	Hometown Community Bancorp, Inc.	3
Amboy Bancorporation	7	HSBC North America Inc.	2
Americorp	1	HSBC USA Inc.	2
Amsouth Bancorporation	2	International Bancshares Corporation	5
ANB Corporation, The	1	J.P. Morgan Chase & co.	2
Associated Banc-Corp	5	JPMorgan Chase & co.	26
Banctrust Financial Group, Inc.	2	K Capital Corporation	2
Bank of America Corporation	14	Mackinac Financial Corporation	1
Bank of Commerce Holdings	2	Mercantile Bancorp, Inc.	2
Belmont Bancorp	6	Mid-America Bancorp	3
Beverly Hills Bancorp Inc.	1	Mountain National Bancshares, Inc.	2
BOH Holdings, Inc.	1	National Bancorp, Inc.	1
Boston Private Financial Holdings, Inc.	1	National Bancshares, Inc.	3
Bostonfed Bancorp, Inc.	1	National City Corporation	4
Bremer Financial Corporation	2	National Commerce Financial Corporation	4
Business Bancshares, Inc.	2	NB Holdings Corporation	2
Capital Bank Financial Corp.	1	New Century Bancorp, Inc.	2
Capital One Financial Corporation	3	Northeast Bancorp	3
Centennial First Financial Services	3	Northern Trust Corporation	1
Central Bancorp, Inc.	3	Old National Bancorp	1
Central Bancshares, Inc.	1	Pacific City Financial Corporation	2
Chinatrust Capital Corporation	8	Pacwest Bancorp	1
CIB Marine Bancshares, Inc.	5	Pontotoc Bancshares Corp.	2
Citicorp	3	Provident Financial Services, Inc.	1
Citigroup Holdings Company	3	Pulaski Financial Corp.	4
Citigroup Inc.	16	R&G Financial Corporation	4
Citizens Commerce Bancshares, Inc.	1	Raymond James Financial, Inc.	3
Comerica Incorporated	3	Regions Financial Corporation	4
Commerce Bancshares, Inc.	1	Riggs National Corporation	2
Commerce National Financial Services, Inc.	1	Saehan Bancorp	7
Community Bancshares, Inc.	2	Santander Holdings USA, Inc.	2
Community West Bancshares	3	Simmons First National Corporation	4
Coppermark Bancshares, Inc.	4	Simplicity Bancorp, Inc.	1
CU Bank Shares, Inc.	1	South Financial Group, Inc., The	4
CVB Financial Corp.	1	Southern Illinois Bancorp, Inc.	1
Discover Financial Services	8	Southern Michigan Bancorp, Inc.	1

1	2	3	4
Legal name	**Freq.**	**Legal name**	**Freq.**
Drew Bancshares, Inc.	1	State Financial Services Corporation	1
Enterprise Financial Services Corp.	1	State Street Corporation	1
Evergreenbancorp, Inc.	1	Sterling Financial Corporation	1
Fidelity D&D Bancorp, Inc.	1	Stifel Financial Corp.	1
Financial Investors of the South, Inc.	1	Summit Financial Group, Inc.	1
First Bancorp	1	Synovus Financial Corp.	6
First bancorp. of durango, Inc.	12	Taunus Corporation	1
First Citizens Bancorp	3	Taylor Capital Group, Inc.	3
First Commonwealth Financial Corporation	1	Tri City Bankshares Corporation	3
First National Bancshares, Inc.	1	U.S. Bancorp	2
First National Community Bancorp Inc.	1	U.S. Trust Corporation	1
First National Of Nebraska, Inc.	1	UCBH Holdings, Inc.	2
First Regional Bancorp	1	UMB Financial Corporation	1
FNB United Corp.	1	Umpqua Holdings Corporation	5
FSB Mutual Holdings, Inc.	3	Wachovia Corporation	2
Goldman Sachs Group, Inc., The	4	Washington Trust Bancorp, Inc.	4
Grand Bankshares, Inc.	3	Webster Financial Corporation	3
Great Southern Capital Corporation	1	West Coast Bancorp	1
Harris Bankcorp, Inc.	3	Westamerica Bancorporation	3
Harris Financial Corp.	2	Total	341

Table 3a - BHCs significantly involved in litigation settlements during 2001–2014

1 Year	2 Frequency of Litigation	3 Average Litigation Settlement ($m)	4 S.D.	5 Median	6 Min	7 Max
2001	17	64,685	28,700.00	54,686.00	5,111.00	150,000.00
2002	32	72,231	14,338.00	79,876.00	19,898.00	89,779.00
2003	17	4,960	2,320.00	6,765.00	200.00	7,059.00
2004	41	919,539	97,877.00	988,997.00	62,999.00	999,978.00
2005	13	666,190	130,988.00	666,890.00	34,002.00	878,999.00
2006	6	5,654	970.00	4,674.00	1,389.00	6,787.00
2007	16	23,542	16,876.00	20,548.00	1,002.00	57,657.00
2008	51	8,751	2,100.00	8,788.00	1,201.00	9,876.00
2009	8	30,563	5,600.00	32,569.00	14,560.00	34,565.00
2010	32	883,612	502,320.00	912,022.00	345,983.00	998,787.00
2011	33	1,058,921	60,898.00	1,098,921.00	9,800.00	220,001.00
2012	42	1,073,620	67,677.00	1,073,550.00	1,789.00	250,505.00
2013	33	2,181,125	89,009.00	2,198,600.00	1,890.00	300,911.00

Source: Author’s calculations, based on statistical analysis of FR-9YC data.